

**ELECTRONIC TECHNOLOGY SYSTEMS
DR. GENZ GMBH**

TEST - REPORT

FCC RULES PART 24

Test report no.:

G5M203080155-P-24

FCC ID: JYCG510

FCC

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1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

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Tester:

23.09.2003

Mr. Schulz

i.s. Kur 

Date

ETS-Lab.

Name

Signature

Technical responsibility for area of testing:

23.09.2003

Dr. Genz

i.A. Genz 

Date

ETS

Name

Signature

1.2 Testing laboratory

1.2.1 Location

ELECTRONIC TECHNOLOGY SYSTEM DR. GENZ GMBH (ETS)
Storkower Straße 38c
D-15526 Reichenwalde b. Berlin
Germany
Telefon : +49 33631 888 00
Telefax : +49 33631 888 660

1.2.2 Details of accreditation status

ACCREDITED TESTING LABORATORY
DAR-REGISTRATION NUMBER: TTI-P-G 126/96

ACCREDITED COMPETENT BODY
DAR-REGISTRATION NUMBER: BPT-ZE-026/96

FCC FILED TEST LABORATORY REG. NO. 96970

BLUETOOTH QUALIFICATION TEST FACILITY (BQTF)
ACCREDITED BY: BLUETOOTH QUALIFICATION REVIEW BOARD (BQRF)

INDUSTRY CANADA FILED TEST LABORATORY REG. NO. IC 3470

A2LA ACCREDITED Certificate Number: 1983-01

1.3 Details of approval holder

| | |
|-----------|---|
| Name | : Pantech Co., Ltd. |
| Street | : Sinsong Center Bldg. 6th Fl., 25-12, Yeouido-dong |
| Town | : Yeoungdeungpo-gu, Seoul |
| Country | : Korea |
| Telephone | : +82-2-3660-5862 |
| Fax | : +82-2-3660-5990 |
| Contact | : Mr. B.W. Kim |
| Email | : bwkim@pantech.co.kr |

1.4 Application details

Date of receipt of application : 18.08.2003
Date of receipt of test item : 18.08.2003
Date of test : 26.08.2003 – 01.09.2003

1.5 Test item

Description of test item : Dual Band GSM 900 (E-GSM)/PCS 1900 (with WAP & GPRS)
Type identification : G510
Serial number : Test model without serial number.
Photos : See annex A

Technical data

Frequency range Tx : 1850.2 - 1909.8 MHz
Frequency range Rx : 1930.2 – 1989.8 MHz
Antenna transmitter : integral (internal antenna)
Antenna Gain : 1 dBi
Power supply : 4,2 V DC
Operating mode : duplex
Type of modulation : GMSK (GSM modulation)
Emission : GXW

Manufacturer: (if applicable)

Name :
Street :
Town :
Country :

Additional information : This device contains 900 MHz GSM functions that are not operational in U.S. territories. This filing is only applicable for 1900 MHz PCS operations.

1.6 Test standards

Technical standard : FCC Part 24

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

or

The deviations as specified in 2.5 were ascertained in the course of the tests performed.

2.2 Test environment

Temperature : 23°C
Relative humidity content : 20 ... 75 %
Air pressure : 86 ... 103 kPa
Extreme temperature : -30 / 50 °C

2.3 Test equipment utilized

| No. | Measurement device: | Type: | Manufacturer: |
|----------|--------------------------------|-----------------|--------------------|
| ETS 0001 | Test receiver | ESHS 10 | Rohde&Schwarz |
| ETS 0002 | Test receiver | ESVP | Rohde&Schwarz |
| ETS 0003 | Test receiver | ESVS 10 | Rohde&Schwarz |
| ETS 0004 | Spectrum- and Network-Analyzer | FSMS 26 | Rohde&Schwarz |
| ETS 0005 | Test receiver | SMV 11 | MEB |
| ETS 0006 | Test receiver system | SME 12 | MEB |
| ETS 0007 | Spectrum analyzer | PSA-65A | Avcom |
| ETS 0008 | Antenna | Loop antenna | Siemens |
| ETS 0009 | Antenna | Loop antenna | MEB |
| ETS 0010 | Antenna | Loop antenna | MEB |
| ETS 0011 | Antenna | van Veen/ Frame | ETS |
| ETS 0012 | Antenna | HK 116 | Rohde&Schwarz |
| ETS 0013 | Antenna | HL 223 | Rohde&Schwarz |
| ETS 0014 | Antenna | HL 025 | Rohde&Schwarz |
| ETS 0015 | Antenna | HL 025 | Rohde&Schwarz |
| ETS 0016 | Antenna | VHAP | Schwarzbeck |
| ETS 0017 | Antenna | VHAP | Schwarzbeck |
| ETS 0018 | Antenna | UHAP | Schwarzbeck |
| ETS 0019 | Antenna | UHAP | Schwarzbeck |
| ETS 0020 | Antenna | DP 21 | MEB |
| ETS 0021 | Antenna | DP 3 | MEB |
| ETS 0022 | Antenna | SAS-200/ 521 | A.H. Systeme / USA |
| ETS 0023 | Antenna | DP 1 | MEB |
| ETS 0024 | Antenna mast | AF 2 | MEB |
| ETS 0025 | Antenna mast | AF 2 | MEB |
| ETS 0026 | Tripod | | Heinrich Deisel |
| ETS 0027 | Tripod | | Heinrich Deisel |
| ETS 0028 | Tripod | STA 2 | C. Lorenz AG |
| ETS 0029 | Tripod | | Berlebach |
| ETS 0030 | Turn table | TT 1 | ETS |
| ETS 0031 | Turn table | DS 412 | Heinrich Deisel |
| ETS 0032 | Controller | HD 050 | Heinrich Deisel |
| ETS 0033 | RF generator | SMG | Rohde&Schwarz |
| ETS 0034 | RF generator/ Amplifier | SMLR | Rohde&Schwarz |
| ETS 0035 | RF generator/ Amplifier | SMLM | Rohde&Schwarz |
| ETS 0036 | RF amplifier | 10W 1000AM2 | Amplifier Research |
| ETS 0037 | RF amplifier | 50W 1000 | Amplifier Research |
| ETS 0038 | RF amplifier | 150L | Amplifier Research |
| ETS 0039 | Absorbing clamp | MDS 21 | Rohde&Schwarz |
| ETS 0040 | Artificial mains | ESH3-Z5 | Rohde&Schwarz |
| ETS 0041 | Artificial mains | ESH3-Z4 | Rohde&Schwarz |
| ETS 0042 | Artificial mains | ESH3-Z6 | Rohde&Schwarz |
| ETS 0043 | Artificial mains | NNB 11 | MEB |
| ETS 0044 | Artificial mains | NNB 111 | MEB |
| ETS 0045 | Stripe line | IEC 801-3 | ETS |
| ETS 0046 | Power supply | LTS 006 | RFT |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|------------------------------|-----------------|-------------------|
| ETS 0047 | Power supply | TG 20/ 1 | Statron |
| ETS 0048 | Power supply | TG 20/ 1 | Statron |
| ETS 0049 | Power supply | T 102 | TPW |
| ETS 0050 | Power supply | T 101b | TPW |
| ETS 0051 | Oscilloscope | TDS 640A | Tektronic |
| ETS 0052 | Audio analyzer | UPA 4 | Rohde&Schwarz |
| ETS 0053 | ECAT Control center | | Keytek/ EMV |
| ETS 0054 | EFT simulator | | Keytek/ EMV |
| ETS 0055 | Module network coupler | | Keytek/ EMV |
| ETS 0056 | Blank plug-in | | Keytek/ EMV |
| ETS 0057 | Module SURGE with DC coupler | | Keytek/ EMV |
| ETS 0058 | Capacitive coupling clamp | | Keytek/ EMV |
| ETS 0059 | Kikusui amplifier | PCR 2000L | Keytek/ EMV |
| ETS 0060 | Xitron power analyzer | | Keytek/ EMV |
| ETS 0061 | Power/ Arb (Harm., Ramp) | | Keytek/ EMV |
| ETS 0062 | Reference impedance | | Keytek/ EMV |
| ETS 0063 | Blank plug-in | | Keytek/ EMV |
| ETS 0064 | Filter system IEC 1000-4-6 | | Keytek/ EMV |
| ETS 0065 | ESD-generator minizap | | Keytek/ EMV |
| ETS 0066 | EM Injection Clamp | | FCC/ EMV |
| ETS 0067 | Calibration Fixture | IEC 801-2031 CF | FCC/ EMV |
| ETS 0068 | Filter system IEC 1000-4-6 | CDN | FCC/ EMV |
| ETS 0069 | EM Radiation Monitor | EMR-20 | Wandel&Goltermann |
| ETS 0070 | PC Transfer set EMR-20 | EMR-20 | Wandel&Goltermann |
| ETS 0071 | Videocamera system | KMB012 | Kocom |
| ETS 0072 | Interphone system | JS-1400 | Jiuh Sheng |
| ETS 0073 | Audio noise meter | GSM 2 | MKD/ RFT |
| ETS 0074 | RF milivoltmeter | QRV 2 | MKD/ RFT |
| ETS 0075 | NF generator | GF 22 | Präcitronic |
| ETS 0076 | Feeding bridge A | SBA 1000 | ESP |
| ETS 0077 | Audio/ Video Filter | AV 55020 | ETS |
| ETS 0078 | LCR meter | SR 720 | SRS |
| ETS 0079 | Functional generator | MX-2020 | Maxcom |
| ETS 0080 | EMI Software | ES-K1 | Rohde&Schwarz |
| ETS 0081 | EMI Software | ES-K10 | Rohde&Schwarz |
| ETS 0082 | PC Novell network system | Novell | Esotronic |
| ETS 0083 | Apple computer system | Performa 630 | Macintosh |
| ETS 0084 | Process controller | PSA 15 | Rohde&Schwarz |
| ETS 0085 | Shielded room | SR 1 | Frankonia |
| ETS 0086 | Anechoic chamber | AC 1 | Frankonia |
| ETS 0087 | Climatic cell | HC 4033 | Heraeus |
| ETS 0088 | Color TV pattern generator | PM 5518-TX VPS | Philips |
| ETS 0089 | Radio communication tester | CMS 54 | Rohde&Schwarz |
| ETS 0090 | DECT type approval CTR06 | TS 8930 | Rohde&Schwarz |
| ETS 0091 | RF signal generator | SME 03 | Rohde&Schwarz |
| ETS 0092 | DM-Coder | SME-B11 | Rohde&Schwarz |
| ETS 0093 | Pulse Modulator | SM-B8 | Rohde&Schwarz |
| ETS 0094 | Rear panel connectors | SME-B19 | Rohde&Schwarz |
| ETS 0095 | DECT system controller | PSMD | Rohde&Schwarz |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|-----------------------------------|---------------|---------------|
| ETS 0096 | DECT Signaling unit | PSMD-B11 | Rohde&Schwarz |
| ETS 0097 | Rack, 19", 36 HU | TS 89RA | Rohde&Schwarz |
| ETS 0098 | System engineering and software | CS 893BE | Rohde&Schwarz |
| ETS 0099 | Extension unit for basic version | TS 8930B | Rohde&Schwarz |
| ETS 0100 | RF signal generator | SME-06 | Rohde&Schwarz |
| ETS 0101 | DM-Coder | SME-B11 | Rohde&Schwarz |
| ETS 0102 | Pulse modulator | SM-B8 | Rohde&Schwarz |
| ETS 0103 | Pulse generator | SM-B4 | Rohde&Schwarz |
| ETS 0104 | Rear panel connectors | SME-B19 | Rohde&Schwarz |
| ETS 0105 | High power synthesizer/ sweeper | SMP 22 | Rohde&Schwarz |
| ETS 0106 | Frequency extension | SMP-B11 | Rohde&Schwarz |
| ETS 0107 | RF attenuator for SMP 22 | SMP-B15 | Rohde&Schwarz |
| ETS 0108 | DECT protocol tester TBR 22 | TS 1220 | Rohde&Schwarz |
| ETS 0109 | Process controller | PSM 2 | Rohde&Schwarz |
| ETS 0110 | Real time signaling unit | PSMD-B2 | Rohde&Schwarz |
| ETS 0111 | PCM Real-time audio interface for | PSMD-B3 | Rohde&Schwarz |
| ETS 0112 | Synthesizer Module | PSMD-B4 | Rohde&Schwarz |
| ETS 0113 | Keyboard | PSA-Z2 | Rohde&Schwarz |
| ETS 0114 | RF step attenuator | RSG | Rohde&Schwarz |
| ETS 0115 | Glide path | | ETS |
| ETS 0116 | RF Milli voltmeter | URV 55 | Rohde&Schwarz |
| ETS 0117 | Insertion unit | URV-Z2 | Rohde&Schwarz |
| ETS 0118 | Mixer | MFC 1000 | Avcom |
| ETS 0119 | Mixer | MFC 2000 | Avcom |
| ETS 0120 | RF step attenuator | TRI-50-20 | INCO |
| ETS 0121 | Oscilloscope | EO 147A | Serute |
| ETS 0122 | Oscilloscope | 5201 | Dagatron |
| ETS 0123 | RF step attenuator | RBU | Rohde&Schwarz |
| ETS 0124 | Tripod | STA 2 | Rohde&Schwarz |
| ETS 0125 | Small components | | |
| ETS 0126 | Uninterruptible power supply | UPS - 1500 | Sendon |
| ETS 0127 | Uninterruptible power supply | UPS - 1000 LC | Sendon |
| ETS 0128 | Uninterruptible power supply | UPS - 1000 | Sendon |
| ETS 0129 | Uninterruptible power supply | UPS - 500 | Sendon |
| ETS 0130 | Uninterruptible power supply | Power saver | Sendon |
| ETS 0131 | Telephone connection box | | Systel |
| ETS 0132 | Frequency doubler | TR-0616 | EMG |
| ETS 0133 | Probe body | P6015 | Tektronix |
| ETS 0134 | Mains filter | MSF | Erika Fiedler |
| ETS 0135 | Measuring switching point | AK 11 | RFT |
| ETS 0136 | Attenuator | 33-6-34 | Weinschel |
| ETS 0137 | Multimeter | YX-360TRA | Mastech |
| ETS 0138 | Multimeter | DT-9410 | Diditec |
| ETS 0139 | Multimeter | ST-9202 | Standard |
| ETS 0140 | High voltage generator | IP 6Wa | TPW |
| ETS 0141 | Sliding bridge | J 573 | RFT |
| ETS 0142 | Impedance converter | TK 11 | RFT |
| ETS 0143 | Impedance converter | TK 12 | RFT |
| ETS 0144 | | | |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|---------------------------------------|----------------|----------------|
| ETS 0145 | | | |
| ETS 0146 | Probe | TK 103 | MEB |
| ETS 0147 | Active probe | ESH2-Z2 | Rohde&Schwarz |
| ETS 0148 | Test TV | 21PT4301/00 | Philips |
| ETS 0149 | Power divider | ZAPD-21 | MCL |
| ETS 0150 | Switcher | HR07-720 | Wisi |
| ETS 0151 | Interference pulse generator | NSG 500C | Schaffner |
| ETS 0152 | Simulator for Load-Dump-Impulse | NSG 506C (I) | Schaffner |
| ETS 0153 | Simulator for Load-Dump-Impulse | NSG 506C (II) | Schaffner |
| ETS 0154 | Signal generator | SMG | Rohde&Schwarz |
| ETS 0155 | Signal generator | SMG | Rohde&Schwarz |
| ETS 0156 | Adjacent channel power meter | NKS | Rohde&Schwarz |
| ETS 0157 | TV and Sat-Signal generator | VTG 700 | Grundig |
| ETS 0158 | TV and Sat Signal generator | VTG 700 | Grundig |
| ETS 0159 | Programmable power supply | TOE 8815 | Toellner |
| ETS 0160 | Protective wire and isolation tester | PI 6001 D | SPS electronic |
| ETS 0161 | Filter system / consumer electronic | | Fiedler |
| ETS 0162 | Acoustic chamber | 403-A | IAC |
| ETS 0163 | Test head | BK 4602 | Brüel & Kjær |
| ETS 0164 | Simulator ear | BK 4185 | Brüel & Kjær |
| ETS 0165 | Simulator mouth | BK 4227 | Brüel & Kjær |
| ETS 0166 | Acoustic calibrator | BK 4231 | Brüel & Kjær |
| ETS 0167 | Communication Analysis System | CAS TE I | HEAD acoustics |
| ETS 0168 | Acoustical test for DECT | CTR 10 | HEAD acoustics |
| ETS 0169 | Measurement - Frontend (analog) | MFE III | HEAD acoustics |
| ETS 0170 | Measurement - Frontend (digital) | MFE IV | HEAD acoustics |
| ETS 0171 | Electronic test cradle | TEH | HEAD acoustics |
| ETS 0172 | Noise generator | HNG III.1 | HEAD acoustics |
| ETS 0173 | Speaker | Canton S Pluss | HEAD acoustics |
| ETS 0174 | Measurement - Frontend line interface | MFE V | HEAD acoustics |
| ETS 0175 | Software Line interface (analog) | COPTZV5 | HEAD acoustics |
| ETS 0176 | Acoustic volt meter | COP 4 | HEAD acoustics |
| ETS 0177 | Feeding bridge B | SBA 1000 | ESP |
| ETS 0178 | Open area test side | 30m | ETS |
| ETS 0179 | Open area test side | 30m | ETS |
| ETS 0180 | Artificial mains | NNB01/RFZ | ETS |
| ETS 0181 | Test pin for protective wire | PE 156-i | SPS electronic |
| ETS 0182 | Power supply | MX-9300 | Maxcom |
| ETS 0183 | Frequency counter | MX-9300 | Maxcom |
| ETS 0184 | Function generator | MX-9300 | Maxcom |
| ETS 0185 | Digital multimeter | MX-9300 | Maxcom |
| ETS 0186 | Power supply | DF 1730 | WJG |
| ETS 0187 | Power supply | | TPW/RFT |
| ETS 0188 | High voltage generator | | |
| ETS 0189 | Spectrum Analyzer | FSEB | Rohde&Schwarz |
| ETS 0190 | Function generator | MX 2020 | Maxcom |
| ETS 0191 | Sweep function generator | 7202 | Dagatron |
| ETS 0192 | Audio generator | 7101 | Dagatron |
| ETS 0193 | Vibration table | N1-201-M | Sandex |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|-----------------------------------|-------------|--------------------|
| ETS 0194 | Digital multimeter | PMM 208 | Dagatron |
| ETS 0195 | Thermo hygro recorder | | Amarell |
| ETS 0196 | Digital thermometer | AK-688 | KD |
| ETS 0197 | Digital thermometer | | Prima |
| ETS 0198 | Digital thermometer | ad 170th | ama-digit |
| ETS 0199 | Digital thermometer | ad 31th | ama-digit |
| ETS 0200 | Digital thermometer / hygro meter | ad 90h | ama-digit |
| ETS 0201 | Digital thermometer / hygro meter | 37950-10 | Cole Parmer |
| ETS 0202 | Digital thermometer | ad 15th | ama-digit |
| ETS 0203 | Digital thermometer | Type K | Amarell |
| ETS 0204 | Digital thermometer | ad 20th | ama-digit |
| ETS 0205 | High voltage test generator | HA 3300 D | SPS electronic |
| ETS 0206 | High voltage test accessories | HVGZ 312 | SPS electronic |
| ETS 0207 | Socket-Outlet torque balance | F 37.13 | PTL |
| ETS 0208 | Unjointed Finger probe | P 10.05 | PTL |
| ETS 0209 | Flexible Finger probe | P 10.01 | PTL |
| ETS 0210 | Spring operated impact hammer | P 22.50 | PTL |
| ETS 0211 | Metallic ball | F 53.32 | PTL |
| ETS 0212 | Hazardous live probe | P 10.06 | PTL |
| ETS 0213 | Hazardous live probe | P 10.11 | PTL |
| ETS 0214 | Ball pressure test apparatus | T 10.02 | PTL |
| ETS 0215 | Glow Wire tester | T 03.14 | PTL |
| ETS 0216 | Force indicator 50N | P 10.31 | PTL |
| ETS 0217 | Milli volt meter | URV 55 | Rohde&Schwarz |
| ETS 0218 | RF probe | URV5-Z7 | Rohde&Schwarz |
| ETS 0219 | Power sensor | NRV-Z2 | Rohde&Schwarz |
| ETS 0220 | Insertion unit | URV5-Z4 | Rohde&Schwarz |
| ETS 0221 | ISDN-S0-Analyzer | K1403 | Siemens |
| ETS 0222 | ISDN Protocol Analyser | TE965 | Tekelec Teleco. |
| ETS 0223 | GSM/ PCN/ PCS-Simul. | TS8915B | Rohde & Schwarz |
| ETS 0224 | GSM System Simulator | FTA | Rohde & Schwarz |
| ETS 0225 | SIM Simulator | | Orga |
| ETS 0226 | SIM Editor | | Orga |
| ETS 0227 | Vibration table | TIRA vib | GenRad |
| ETS 0228 | Climatic chamber | VT 4010 | Vötsch |
| ETS 0229 | Radio Commun. Tester | CMT 54 | Rohde & Schwarz |
| ETS 0230 | Radio Commun. Tester | CMD 65 | Rohde & Schwarz |
| ETS 0231 | Testreceiver | ESVS 30 | Rohde & Schwarz |
| ETS 0232 | Radiation test source | VSO 1 | MEB |
| ETS 0233 | Direction coupler | RK 100 | MEB |
| ETS 0234 | Power meter | NRVD | Rohde & Schwarz |
| ETS 0235 | RF-network-analyser | 8752 C | Hewlett Packard |
| ETS 0236 | RF-amplifier | 100A100 | Amplifier Research |
| ETS 0237 | RF-amplifier | 100W1000M1 | Amplifier Research |
| ETS 0238 | Field strength meter | FM 2000 | Amplifier Research |
| ETS 0239 | Isotr. field probe 40 GHz | FP 2080 Kit | Amplifier Research |
| ETS 0240 | Isotr. field probe 1 GHz | FP 2000 Kit | Amplifier Research |
| ETS 0241 | Pulse Generator | 4050 | PicoSecond PL |
| ETS 0242 | Harmonics analyser | F 41B | Fluke |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|------------------------|-----------|-----------------|
| ETS 0243 | AC-clamp 1000 A | 80i 1000s | Fluke |
| ETS 0244 | Burst generator | EFT 200 | EM-Test |
| ETS 0245 | Load dump generator | LD 200 | EM-Test |
| ETS 0246 | Voltage drop simulator | VDS 200 | EM-Test |
| ETS 0247 | Microsecond generator | MPG 200 | EM-Test |
| ETS 0248 | Switch unit | AN 200 | EM-Test |
| ETS 0249 | Coupling network | CNA 200 | EM-Test |
| ETS 0250 | Coupling clamp | ACC | EM-Test |
| ETS 0252 | System controller | PSM 12 | Rohde & Schwarz |
| ETS 0253 | Spectrum analyser | FSIO | Rohde & Schwarz |
| ETS 0254 | RF generator | SMIO 03 | Rohde & Schwarz |
| ETS 0255 | RF generator | SMIO 03 | Rohde & Schwarz |
| ETS 0256 | RF generator | SMP 03 | Rohde & Schwarz |
| ETS 0257 | Step attenuator | RSP | Rohde & Schwarz |
| ETS 0258 | Rubidium standard | RSTU | DATUM GmbH |
| ETS 0259 | Power meter | NRVD | Rohde & Schwarz |
| ETS 0260 | Power sensor | NRVD-Z1 | Rohde & Schwarz |
| ETS 0261 | Power sensor | NRVD-Z1 | Rohde & Schwarz |
| ETS 0262 | Switching unit | SSCU | Rohde & Schwarz |
| ETS 0263 | Signaling unit | | Wird |
| ETS 0264 | Spectrum analyser | F 1048 | HAMEG |
| ETS 0265 | Loop antenna | HFRA 9150 | Schwarzbeck |
| ETS 0267 | RF signal generator | SMT 03 | Rohde & Schwarz |
| ETS 0268 | RF signal generator | SMP 02 | Rohde & Schwarz |
| ETS 0270 | RF signal generator | SMP 04 | Rohde & Schwarz |
| ETS 0271 | Test receiver | ESI 40 | Rohde & Schwarz |
| ETS 0272 | RF signal generator | SME 03 | Rohde & Schwarz |
| ETS 0273 | RF signal generator | SME 03 | Rohde & Schwarz |
| ETS 0274 | RF signal generator | SMY 01 | Rohde & Schwarz |
| ETS 0275 | Power sensor | NRV-Z51 | Rohde & Schwarz |
| ETS 0276 | Audio analyser | UPL | Rohde & Schwarz |
| ETS 0277 | Power sensor | NRV-Z1 | Rohde & Schwarz |
| ETS 0278 | Power sensor | NRV-Z31 | Rohde & Schwarz |
| ETS 0279 | Step attenuator | RSP | Rohde & Schwarz |
| ETS 0280 | Power meter | NRVD | Rohde & Schwarz |
| ETS 0281 | Spectrum analyser | FSM | Rohde & Schwarz |
| ETS 0282 | RF bridge | 86207 A | Hewlett Packard |
| ETS 0283 | RF bridge | 86205 A | Hewlett Packard |
| ETS 0284 | Field probe | 11940 A | Hewlett Packard |
| ETS 0285 | Field probe | 11941 A | Hewlett Packard |
| ETS 0286 | Limiter | 11867 A | Hewlett Packard |
| ETS 0287 | Test receiver | ESHS 10 | Rohde & Schwarz |
| ETS 0288 | Artificial mains | ESH2-Z5 | Rohde & Schwarz |
| ETS 0289 | Audio generator | TAG 101 | Troneer |
| ETS 0290 | Audio generator | TAG 101 | Troneer |
| ETS 0291 | Loop antenna | HFH2-Z2 | Rohde & Schwarz |
| ETS 0292 | RF generator | SMHU | Rohde & Schwarz |
| ETS 0293 | Artificial mains | NNBM 8125 | Schwarzbeck |
| ETS 0294 | Biconical antenna | HK 116 | Rohde & Schwarz |

| No. | Measurement device: | Type: | Manufacturer: |
|----------|------------------------------|-------------------|--------------------|
| ETS 0295 | LPD antenna | HL 223 | Rohde & Schwarz |
| ETS 0296 | Oscilloscope | TDS 520 A | Tektronix |
| ETS 0297 | Power pulse generator | IGUF 2910 | Schwarzbeck |
| ETS 0298 | ICO tester | TS 1232 | Rohde & Schwarz |
| ETS 0299 | DECT protocol tester | TS 1220 | Rohde & Schwarz |
| ETS 0300 | RF amplifier | 75 A 250 | Amplifier Research |
| ETS 0301 | Relay switch unit | RSU | Rohde & Schwarz |
| ETS 0302 | Data line CDN | CM-I/O CD | Kevtek |
| ETS 0303 | Telecom line CDN | CM-TEL CD | Kevtek |
| ETS 0304 | Test receiver | ESHS 10 | Rohde & Schwarz |
| ETS 0305 | Test receiver | ESVS 10 | Rohde & Schwarz |
| ETS 0306 | Function generator | HP 33120A | Hewlett Packard |
| ETS 0307 | Commu. Sign. Analyzer | CSA 803 A | Tektronix |
| ETS 0308 | Spectrum analyzer | R 3361A | Advantest |
| ETS 0309 | Anechoic chamber | AC 2 | Frankonia |
| ETS 0310 | Anechoic chamber | AC 3 | Frankonia |
| ETS 0311 | Anechoic chamber | AC 4 | Frankonia |
| ETS 0312 | Climatic chamber | VC 0033 | Vötsch |
| ETS 0313 | Power sensor | NRV-Z51 | Rohde & Schwarz |
| ETS 0314 | LPD antenna | HL 223 | Rohde & Schwarz |
| ETS 0315 | Biconical antenna | HK 116 | Rohde & Schwarz |
| ETS 0316 | Switcher | Hr 07-720 | WISI |
| ETS 0317 | Switcher | Hr 07-720 | WISI |
| ETS 0318 | Dial pulse/ DTMF tester | 210 | HE |
| ETS 0319 | Opto link | GPIB 140 | NI |
| ETS 0320 | Opto link | GPIB 140 | NI |
| ETS 0321 | RF Millivoltmeter | URV 55 | Rohde & Schwarz |
| ETS 0322 | Insertion unit | URV5-Z4 | Rohde & Schwarz |
| ETS 0323 | DECT portable part | Gigaset 1000 | SIEMENS |
| ETS 0324 | DECT fix part | Gigaset 1000 | SIEMENS |
| ETS 0325 | DECT portable part | | Philipp |
| ETS 0326 | DECT fix part | | Philipp |
| ETS 0327 | Blue Unit | V 2.0 | Nokia |
| ETS 0328 | BT Protocol tester | PTW 60 | Rohde & Schwarz |
| ETS 0330 | Spectrum analyzer | FSM | Rohde & Schwarz |
| ETS 0333 | Turn table | DE 350 | Heinrich Deisel |
| ETS 0334 | Controller | HD 100 | Heinrich Deisel |
| ETS 0335 | BT Development kit | CASIRA | CSR |
| ETS 0336 | LPD Antenna | HL 223 | Rohde & Schwarz |
| ETS 0337 | Professional Power Amplifier | SE-1200 | Wharfedale Pro |
| ETS 0338 | Coupling network | KN002 | ETS |
| ETS 0339 | Isolating Transformer | KN003 | ETS |
| ETS 0340 | Bluetooth test set | TS8960 | Rohde & Schwarz |
| ETS 0341 | EN 61000-4-8 Test System | F-1000-4-8/9/10-L | Fisher Custom |

3 Test results (enclosure)

| TEST CASE | | Required | Test passed | Test failed |
|---------------------------------------|----------------|-------------------------------------|-------------------------------------|--------------------------|
| RF Power Output | 2.1046 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Radiated Power | 24.232 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Occupied Bandwidth | 2.1049; | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Field Strength of Spurious Radiations | 2.1053, 24.238 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Line Conducted Emissions | 15.207 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Frequency Stability vs. Temperature | 2.1055, 24.235 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Frequency Stability vs. Voltage | 2.1055, 24.235 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

4 RF Power Output, FCC 2.1046

4.1. Test procedure

The transmitter output was connected by dint of a calibrated cable to a system simulator. The test was performed at three frequencies (low, middle and high channels) and on all power levels, which can be setup on the transmitter

4.2. Test Results

| Frequency Channel | Peak Output Power |
|-------------------|-------------------|
| 512 | 28,72 dBm |
| 661 | 28,60 dBm |
| 810 | 28,92 dBm |

Comment: See attached diagrams in appendix B.

5 Radiated Power

FCC 24.232

The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

5.1 Test Procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane. The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer.

Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna.

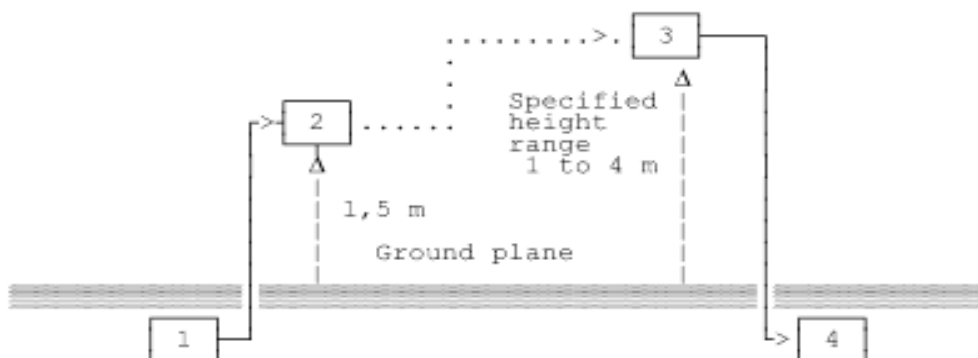
Radiated Power was measured using a substitution method. The EUT was replaced by horn antenna connected to a signal generator.

Substitution RF power measurement at ETS Dr Genz GmbH

General:

The applied substitution method follows ANSI/TIA/EIA-603, ANSI/TIA/EIA-102.CAAA or the appropriate ETSI rules respectively.

The actual signal generated by the EUT can be determined by means of a substitution measurement in which a known signal source replaces the device to be measured.



- 1) Signal generator;
- 2) Substitution antenna;
- 3) Test antenna;
- 4) Spectrum analyzer or selective voltmeter.

The substitution antenna replaces the transmitter antenna at the same position and in vertical polarisation. The frequency of the signal generator shall be adjusted to the measurement frequency. The test antenna shall be raised or lowered, if necessary, to ensure that the maximum signal is still received. The input signal to the substitution antenna shall be adjusted in level until an equal or a known related level to that detected from the transmitter is obtained in the measurement receiver. If a fully anechoic chamber is used as test site in order to provide free space conditions there is no need to change the height of the antenna. The measurement will be repeated in horizontal position.

Calibration:

In order to make this kind of measurement more effective and to avoid subjective measurement faults ETS has installed automatic computer controlled measurement procedures.

With the above described substitution method a test site is calibrated over the full frequency range which is used in suitable frequency steps. For a certain power level on the substitution antenna the received power over the whole frequency range is documented. All necessary antenna gains, cable losses, filter losses and amplifications of preamplifiers are taken in consideration. The summary of this calibration measurement performs a transducer factor that is related to the considered test site and a certain measurement distance. Differences of the radiated power levels of different test samples are determined by internal attenuation of the measurement receiver. The proper function of such test site will be maintained by short term plausibility checks and periodical re-calibration.

Testing:

Now the test sample will be putted on the table at the defined position and the radiated power will be received and documented by the measurement receiver.

On test sites with ground plane the measurement antenna will be lowered and raised to maximum values at significant frequencies.

For peak power measurements the sample is turned by the turntable over 360 degree in order to find the direction with the maximum radiation or to document the max reading with the MAXHOLD function during the rotation.

5.2 Test results

| Radiated Power | |
|-----------------------|-----------|
| Channel 512 | 30,45 dBm |
| Channel 661 | 29,13 dBm |
| Channel 810 | 27,96 dBm |

Comment: See attached diagrams in appendix C.

6 Occupied Bandwidth, FCC 2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.1. Test procedure

The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation.

Occupied Bandwidth was measured with a occupied bandwidth function of the analyzer.

To find the Emission Bandwidth (-26dB) the delta markers were set -26 dB below transmitter power.

6.2. Test Results

| | Occupied Channel Bandwidth | Emission Bandwidth |
|-------------|-----------------------------------|---------------------------|
| Channel 512 | 246,5 kHz | 316,6 kHz |
| Channel 661 | 246.5 kHz | 314.6 kHz |
| Channel 810 | 245.5 kHz | 312.6 kHz |

Comment: See attached diagrams in appendix D.

7 Field Strength of Spurious Radiations, FCC 2.1053, 24.238

7.1 Test procedure

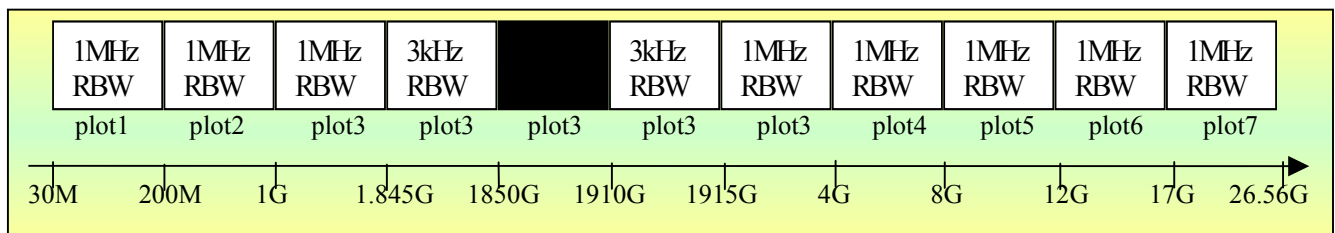
The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane. The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer.

Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna.

ERP was measured using a substitution method. The EUT was replaced by horn antenna connected to a signal generator.

The frequency range up to tenth harmonic was investigated.

The tests of spurious radiated emission were made with the EKS-Software from Rode & Schwarz. The analyser gives automatic the measurements of spectral plots to the EKS software.



In the 1st 1MHz band outside the band edge nearest the channel of interest a 3 kHz res. BW is used. The measurements from 30MHz to 1845 GHz and 1915GHz to 26.56GHz were performed with a measurement bandwidth of 1MHz.

7.2 Test Results

The radiated spurious emissions were measured for channel 512, channel 661 and channel 810, respectively the upper, center, and lower frequencies of the USPCS band (1850.2 MHz, 1880.0 MHz and 1909.8 MHz).

The measurement diagrams show that all significant spurs are well below the limit line.

7.2.1 Purpose

The measurements of the spurious emissions at the equipment output terminals were performed pursuant to § 2.1053 in order to verify that any emissions are below the limits given by § 24.238.

Summary table with radiated data of the test plots for Carrier Test Frequency 1850.2 MHz

| Spectral Plot | Frequency Marker Indication [MHz] | Indication Power Level [dBm] | External Attn. [dB] | Worst Case Emission Level [dBm] | Compliance Limit [dBm] | Results |
|---------------|-----------------------------------|------------------------------|---------------------|---------------------------------|------------------------|---------|
| vertical | 198.300 | -52,44 | 0 | -52,44 | -13 | -39,44 |
| horizontal | 42.844 | -52,29 | 0 | -52,29 | -13 | -39,29 |
| vertical | 986.667 | -39,48 | 0 | -39,48 | -13 | -26,48 |
| horizontal | 851.556 | -73,85 | 0 | -73,85 | -13 | -60,85 |
| vertical | 3.961.000 | -22,19 | 0 | -22,19 | -13 | -9,19 |
| horizontal | 3.986.000 | -22,26 | 0 | -22,26 | -13 | -9,26 |
| vertical | 7.973.000 | -44,87 | 0 | -44,87 | -13 | -31,87 |
| horizontal | 7.991.000 | -44,61 | 0 | -44,61 | -13 | -31,61 |
| vertical | 11.102.000 | -31,66 | 0 | -31,66 | -13 | -18,66 |
| horizontal | 9.253.000 | -25,14 | 0 | -25,14 | -13 | -12,14 |
| vertical | 17.460.000 | -32,04 | 0 | -32,04 | -13 | -19,04 |
| horizontal | 17.440.000 | -31,97 | 0 | -31,97 | -13 | -18,97 |
| vertical | 18.510.000 | -25,42 | 0 | -25,42 | -13 | -12,42 |
| horizontal | 26.368.000 | -24,67 | 0 | -24,67 | -13 | -11,67 |

Summary table with radiated data of the test plots for Carrier Test Frequency 1880.0 MHz

| Spectral Plot | Frequency Marker Indication [MHz] | Indication Power Level [dBm] | External Attn. [dB] | Worst Case Emission Level [dBm] | Compliance Limit [DBM] | Results |
|----------------------|--|-------------------------------------|----------------------------|--|-------------------------------|----------------|
| vertical | 84.778 | -46,67 | 0 | -46,67 | -13 | -33,67 |
| horizontal | 46.056 | -52,11 | 0 | -52,11 | -13 | -39,11 |
| vertical | 993.778 | -39,91 | 0 | -39,91 | -13 | -26,91 |
| horizontal | 854.222 | -74,00 | 0 | -74,00 | -13 | -61,00 |
| vertical | 3.940.000 | -22,47 | 0 | -22,47 | -13 | -9,47 |
| horizontal | 3.965.000 | -21,39 | 0 | -21,39 | -13 | -8,39 |
| vertical | 7.520.000 | -43,96 | 0 | -43,96 | -13 | -30,96 |
| horizontal | 5.644.000 | -43,93 | 0 | -43,93 | -13 | -30,93 |
| vertical | 11.280.000 | -33,64 | 0 | -33,64 | -13 | -20,64 |
| horizontal | 11.284.000 | -27,38 | 0 | -27,38 | -13 | -14,38 |
| vertical | 13.160.000 | -28,85 | 0 | -28,85 | -13 | -15,85 |
| horizontal | 13.167.000 | -28,03 | 0 | -28,03 | -13 | -15,03 |
| vertical | 26.462.000 | -25,04 | 0 | -25,04 | -13 | -12,04 |
| horizontal | 26.406.000 | -24,92 | 0 | -24,92 | -13 | -11,92 |

Summary table with radiated data of the test plots for Carrier Test Frequency 1909.8 MHz

| Spectral Plot | Frequency Marker Indication [MHz] | Indication Power Level [dBm] | External Attn. [dB] | Worst Case Emission Level [dBm] | Compliance Limit [dBm] | Results |
|---------------|-----------------------------------|------------------------------|---------------------|---------------------------------|------------------------|---------|
| vertical | 185.267 | -52,35 | 0 | -52,35 | -13 | -39,35 |
| horizontal | 89.878 | -39,93 | 0 | -39,93 | -13 | -26,93 |
| vertical | 979.556 | -39,66 | 0 | -39,66 | -13 | -26,66 |
| horizontal | 865.778 | -73,64 | 0 | -73,64 | -13 | -60,64 |
| vertical | 1.910.000 | -19,34 | 0 | -19,34 | -13 | -6,34 |
| horizontal | 3.984.000 | -21,29 | 0 | -21,29 | -13 | -8,29 |
| vertical | 7.973.000 | -45,38 | 0 | -45,38 | -13 | -32,38 |
| horizontal | 5.729.000 | -42,36 | 0 | -42,36 | -13 | -29,36 |
| vertical | 11.462.000 | -30,02 | 0 | -30,02 | -13 | -17,02 |
| horizontal | 11.462.000 | -21,38 | 0 | -21,38 | -13 | -8,38 |
| vertical | 17.467.000 | -32,60 | 0 | -32,60 | -13 | -19,60 |
| horizontal | 13.373.000 | -25,58 | 0 | -25,58 | -13 | -12,58 |
| vertical | 18.525.000 | -25,11 | 0 | -25,11 | -13 | -12,11 |
| horizontal | 18.482.000 | -25,10 | 0 | -25,10 | -13 | -12,10 |

7.2.2 Limits

Compliance with § 24.238 requires that any emission be attenuated below the transmitter power by at least $43 + 10 \log_{10} P$ (P = transmitter power in Watts).

The compliance limit was calculated as per the following table:

GMSK modulation

| | |
|---|---|
| Maximum transmitter output power | 1,1090 W = 30,45 dBm |
| Required attenuation | $43 + 10 \log_{10} 1,1090 = 43,45$ dB |
| Maximum transmitter output power <u>Required attenuation</u> Compliance limit | 30,45 dBm <u>- 43,45 dB</u> -13 dbm |

Comment: See attached diagrams in appendix E.

8 Line Conducted Emissions, FCC 15.207

8.1 Test procedure

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

| Frequency | Max. Level | |
|-----------|------------------|------------------|
| | quasi-peak | average |
| -- kHz | lower limit line | lower limit line |

Limits:

| Frequency of Emission (MHz) | Conducted Limit (dBuV) | |
|-----------------------------|------------------------|----------|
| | Quasi Peak | Average |
| 0.15-0.5 | 66 to 56 | 56 to 46 |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

This test is not required for devices which only employ battery power and not contain provisions while connected to the AC power lines.

Test equipment used: ETS 0003, ETS 0040, ETS 0109, ETS 0125

Comment: see attached diagram

9 Frequency Stability vs Temperature, FCC 2.1055, 24.235

9.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable, exited the chamber through an opening made for that purpose.

After the temperature stabilized the frequency output was recorded from the counter.

9.2 Test Results

| ϑ / °C | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|----------------------|-----------------------|
| 50,0 | 145 | 0,07712766 |
| 40,0 | 38 | 0,02021277 |
| 30,0 | 36 | 0,01914894 |
| 20,0 | -22 | -0,01170213 |
| 10,0 | 48 | 0,02553191 |
| 0,0 | 52 | 0,02765957 |
| -10,0 | -39 | -0,02074468 |
| -20,0 | 59 | 0,03138298 |
| -30,0 | 87 | 0,04627660 |

10 Frequency Stability vs Voltage, FCC 2.1055, 24.235

10.1 Test procedure

An external variable DC power supply was connected to the battery terminals of the equipment under test.

For hand carried, battery powered equipment primary supply voltage was reduced to the battery operating end point as specified by the manufacturer. The output frequency was recorded for each battery voltage.

10.2 Test results

| U_B / V | Frequency Error (Hz) | Frequency Error (ppm) |
|-----------|----------------------|-----------------------|
| 4,8 | -40 | -0,02127660 |
| 4,6 | -36 | -0,01914894 |
| 4,4 | -20 | -0,01063830 |
| 4,2 | -26 | -0,01382979 |
| 4,0 | -31 | -0,01648936 |
| 3,8 | -29 | -0,01542553 |
| 3,6 | -23 | -0,01223404 |
| 3,5 | -73 | -0,03882979 |

Appendix

- A Pictures
- B RF Power Output
- C Radiated Power
- D Occupied Bandwidth
- E Field Strength of Spurious Radiations
- F Line Conducted Emissions
- G Frequency Stability vs. Temperature
- H Frequency Stability vs. Voltage



Appendix A

Pictures